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# Prism Adaptation and Visual Scanning Training treatments in Unilateral Spatial Neglect

Salatino A.<sup>1</sup>, Barba S. <sup>1,2</sup>, Vigna F. <sup>1</sup>, Arzenton V.<sup>1</sup>, Sibilli E. <sup>1</sup>, Ferracini S. <sup>1</sup>, Gindri P. <sup>1,2</sup>, Ricci R.<sup>1</sup>

<sup>1</sup> Department of Psychology, University of Turin, Italy  
<sup>2</sup> Neuropsychological services, Sanitary Garrison 'San Camillo', Turin, Italy

## Introduction

Visual Scanning Training (VST) and Prism Adaptation (PA) are two of the most effective approaches in neglect rehabilitation. However, it is not clear whether one or the other intervention may represent the elective treatment for targeting specific forms of neglect. Given the different mechanisms underlying VST and PA (i.e. top-down and bottom-up mechanisms, respectively), we investigated putative differences in the efficacy of the two treatments on clinical measures and specific symptoms of USN (i.e. perceptual and response components). The effects of PA and VST on visual neglect were compared in twelve patients with right hemisphere lesion (RHL) and left neglect.

## Methods

**Participants:** 12 RHL patients with left neglect (see Table 1)  
**Neglect evaluation:** Behavioral Inattention Test (BIT)  
**2 Treatments:** daily PA (Fig. 1a) or VST (Fig. 1b) were administered for five days a week, for two weeks  
**PA:** the PA was administered according to the procedure described by Serino et al., 2007  
**VST:** we used a modified version of the procedure used by Diller et al., 1974. Cancellation task with 6 levels of decreasing external cues (red lines and numbers)/verbal aids and increasing task difficulty (3 levels) to improve contralesional visual exploration



Fig.1a

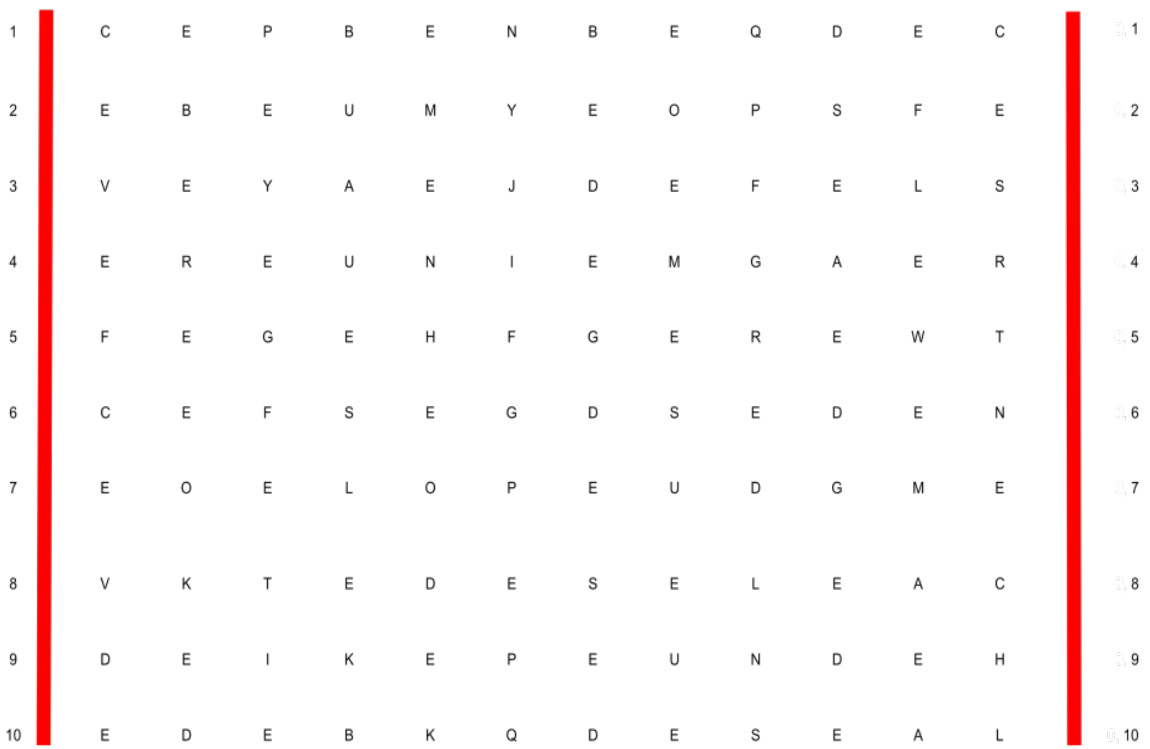


Fig.1b

	Patient	Sex	Age (years)	Education (years)	Handedness	Length of illness (days)	Lesion ('TAC)	Etiology
PA	V.A.	F	85	8	R	16	P	I
	P.L.	F	70	11	R	23	bg ic ins th	I
	M.L.	F	85	5	R	23	F P T	I
	M.G.	M	79	8	R	23	O	I
	M.U.	M	73	13	R	32	F P T	N
	A.C.	F	69	12	R	27	ic th	H
VST	C.I.	F	83	18	R	25	bg ic ins O P T th	I
	M.A.R.	F	66	13	R	109	bg ic ins F P T	N
	S.M.A.	F	75	8	R	20	bg ic ins th	H
	G.E.	M	76	5	R	37	bg ic ins F	I
	V.R.	F	72	5	R	21	F P T	I
	T.L.	F	65	5	R	77	F P	I

Table 1: T= temporal; F= frontal; P= parietal; O= occipital; th= thalamus; ic= internal capsule; ins= insula; bg= basal ganglia; I=ischemia; H= haemorrhage; N= neoplasia.

## 2 Experimental Tasks:

- 1) Landmark Task (Bisiach at al., 1998) to disentangle perceptual and response biases that may underlie the neglect patients' performance (Fig.2a).
- 2) Necker cube perception (Fig.2b).

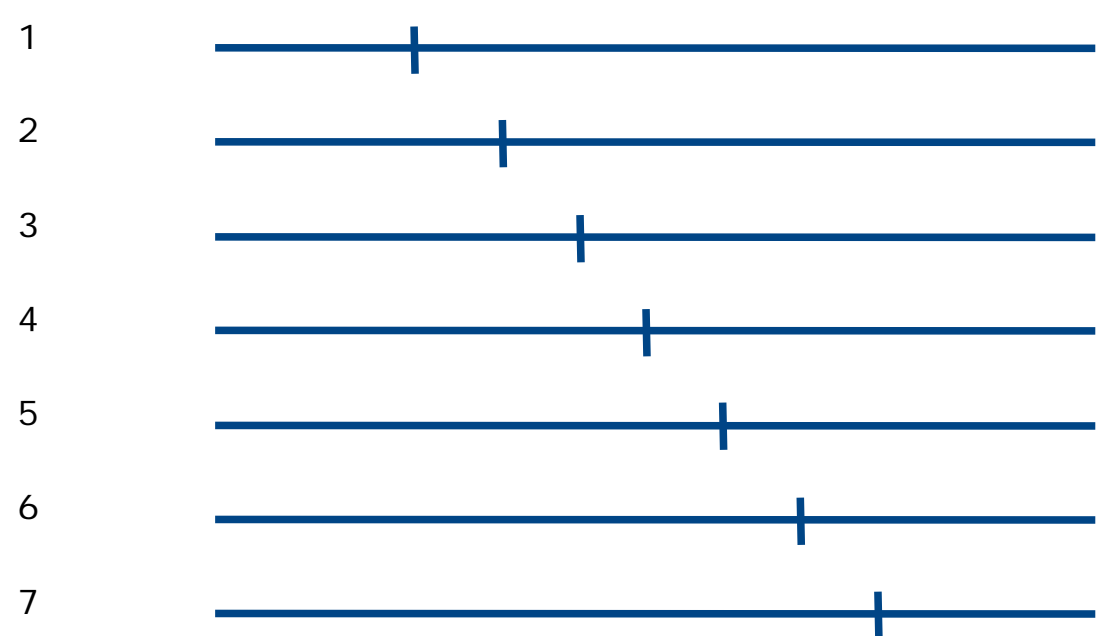


Fig.2a

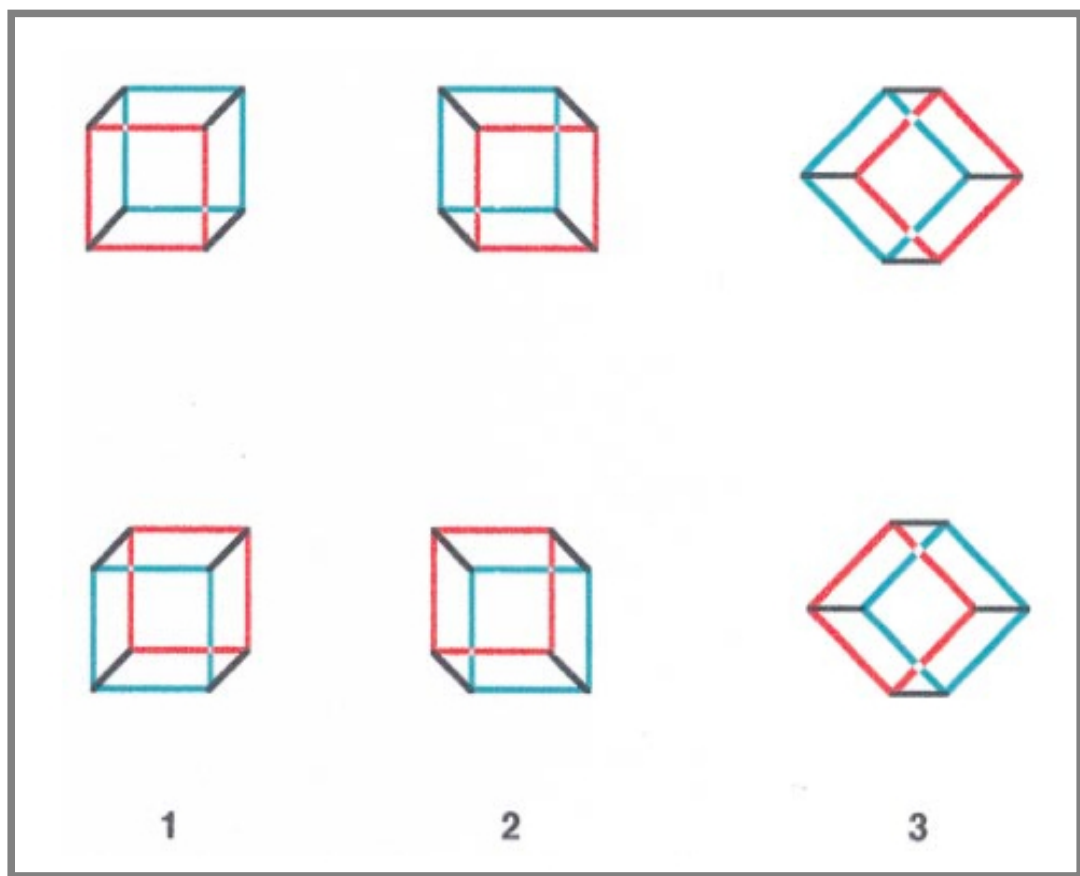


Fig.2b

## Procedure

Six patients were pseudo-randomly assigned to the PA treatment and the other six to the VST treatment. The BIT and the Experimental tasks were given before and after treatment. A follow-up evaluation was performed at two weeks from the end of the treatment (Fig. 3).

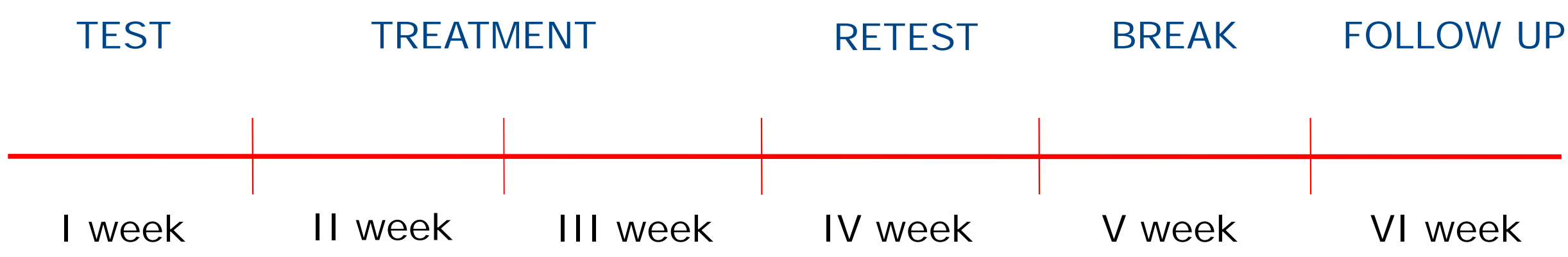


Fig.3

## Results

Both interventions improved the overall BIT score. However, VST showed long lasting effects on both conventional and behavioral sub-tests, while PA produced long term effects exclusively on the behavioral sub-tests. (see Fig. 4 a and b).

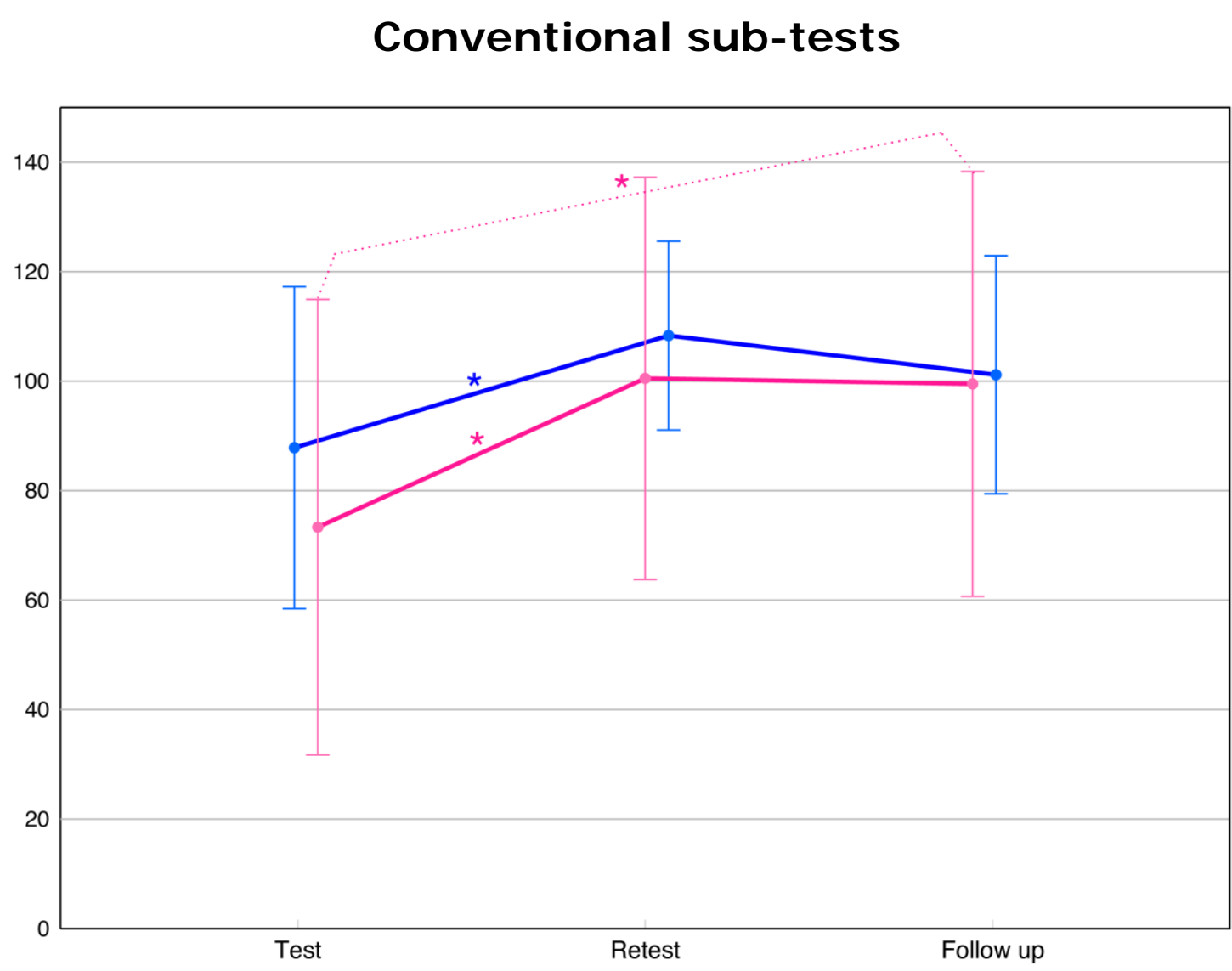


Fig.4a

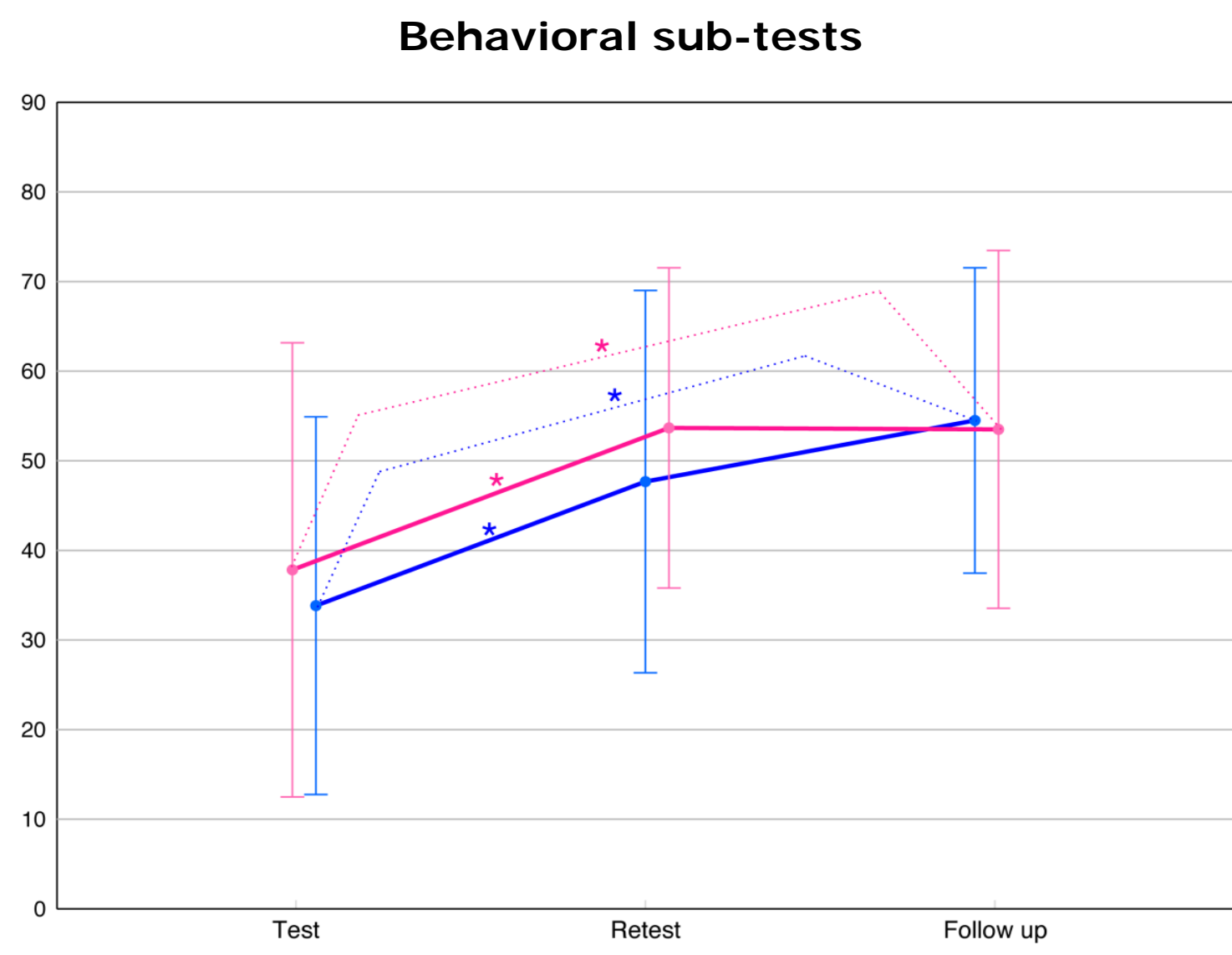


Fig.4b

## Landmark Task:

Findings on the Landmark Task indicated that VST mainly improved patients' response bias. PA mainly reduced patients' perceptual bias.

## Necker cube perception:

Consistent with this result, PA had greater effects than VST in normalizing patients' bias on the Necker cube task.

## Discussion and Conclusions

The findings of this study indicate that although both PA and VST treatments are effective in improving USN, they affect its symptoms differentially, according to whether USN occur at input or output stages of visual processing, respectively. Future investigations are necessary to further clarify whether VST may be an elective treatment in patients with response bias and PA in patients with perceptual bias. Understanding which treatment is the most effective on specific forms of neglect may lead to optimize the time and the quality of patients' recovery.

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**Contact:** [adriana.salatino@unito.it](mailto:adriana.salatino@unito.it), [raffaella.ricci@unito.it](mailto:raffaella.ricci@unito.it)